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BLASTOBASIS GRAMINEA, NEW SPECIES (LEPIDOPTERA: GELECHIOIDEA: COLEOPHORIDAE: BLASTOBASINAE), A STEM BORER OF SUGAR CANE IN COLOMBIA AND VENEZUELA

DAVID ADAMSKI

Research Associate, Department of Entomology, MRC-127, Smithsonian Institution, Washington, DC 2056-0127, U.S.A.

Abstract.—***Blastobasis graminea*, new species**, a stem borer of sugar cane in Colombia and Venezuela, is described and illustrated. For the first time, a larva of Blastibasini is described in detail. Scanning electron micrographs of the larva, illustrations of the larval mandible, setal maps, and photographs of larval damage and pupation sites are provided. *Auximobasis obstricta* Meyrick 1918, is transferred to *Blastobasis* Zeller 1855, **n. comb.**, and *Blastobasis subolivacea* Walsingham 1897, is transferred to *Holcocera* Clemens 1863, **n. comb.**

Key Words: Coleophoridae, Blastobasinae, *Blastobasis*, sugar cane, Colombia, Venezuela

For decades, entomologists have known that larvae of at least one species of microlepidoptera other than *Diatraea saccharalis* (Fabricius) (Crambidae) feed on sugar cane and related grasses in Latin America. Although adult specimens of one species of Coleophoridae (Blastobasinae) have been collected since the late 1940's and 1950's by H. E. Box in Venezuela and during the early 1970's and 1980's by L. Cárdenas and others in Colombia, this moth remained nameless.

Because many Blastobasinae are similar in wing pattern, they are frequently misidentified. For example, the species described herein, *Blastobasis graminea*, had been previously misidentified as *Auximobasis obstricta* Meyrick 1918, (Box 1953, Guagliumi 1962) and *Blastobasis subolivacea* Walsingham 1897, (Martorell 1976). In addition, type specimens of Neotropical Blastobasinae have not been studied systematically until recently.

Since Meyrick (1894) the Blastobasinae have long been considered to be monophyletic; recent studies (Adamski and Brown 1989, Hodges, in press) have corroborated this notion and postulated phylogenetic relationships of the Blastobasinae within Gelechioidea. In this study, the Blastobasidae (*sensu* Adamski and Brown 1989) are treated as a subfamily within the Coleophoridae, following Hodges (in press).

The purpose of this paper is to describe and illustrate *Blastobasis graminea*, new species, and to make available to entomologists and sugar cane growers a means by which to identify it.

Adult and larvae were examined using an incandescent light source (reflected light). Kornerup and Wanscher (1978) was used as a color standard for the description of the adult. Genitalia were dissected as described by Clarke (1941), except Mercurochrome and chlorazol black were used as stains. Slide preparations were examined with dissecting and compound microscopes. Measurements were made with a calibrated ocular micrometer. All specimens examined are deposited in The National Museum of

Fig. 1. Holotype of *Blastobasis graminea*.

Natural History, Smithsonian Institution, Washington, D.C., (USNM), except where indicated otherwise. Label data taken verbatim are expressed with quotations, while bracketed data are used to complete label data written in abbreviated form, or to help with the recognition of certain labels by description of condition, e.g., [round label].

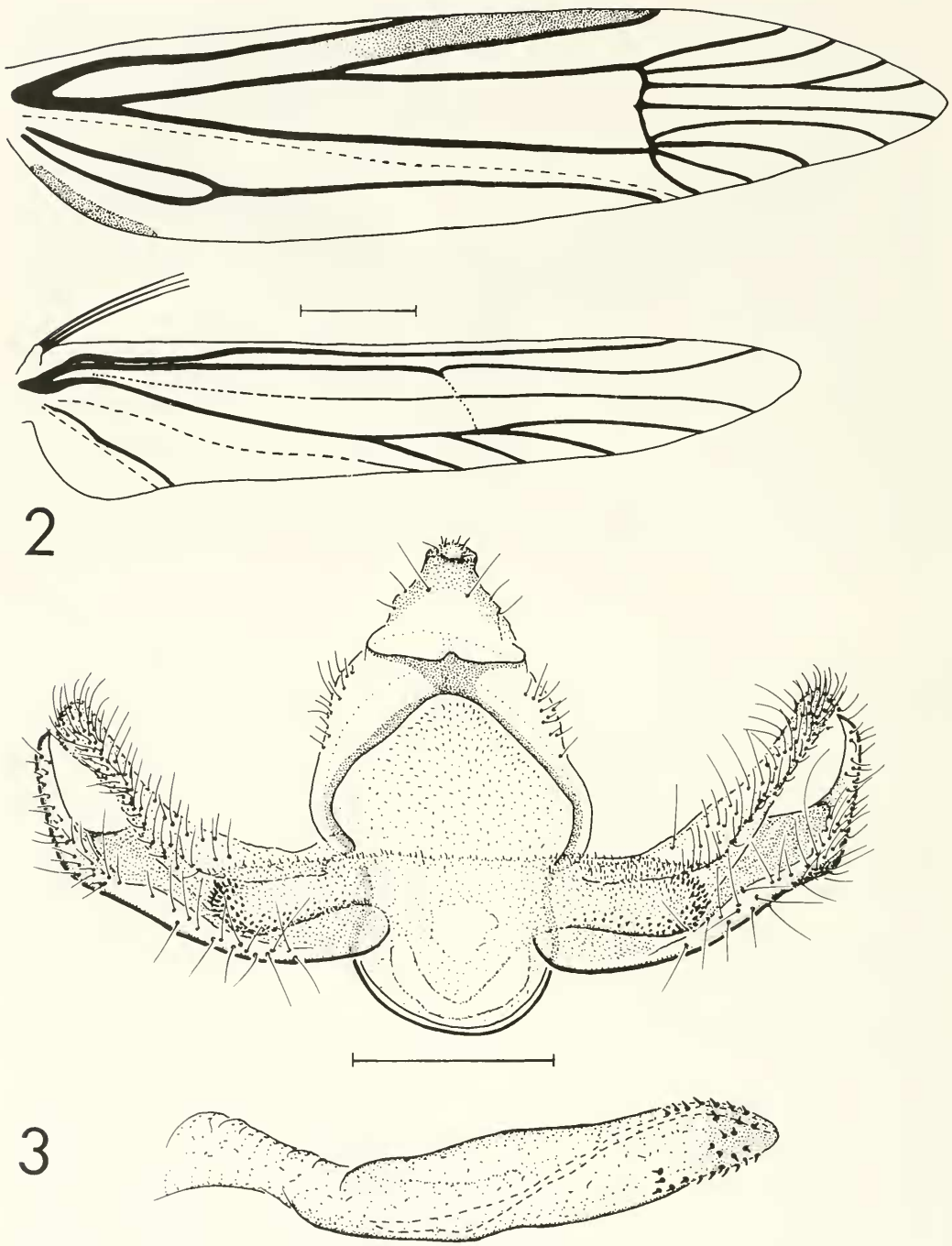
The ultrastructure of the larva was studied with an Hitachi HH-S-2R scanning electron microscope at an accelerating voltage of 20 kV. For SEM examination, larvae were fixed in 3% glutaraldehyde in 0.1 M potassium phosphate buffer (pH 7.3), rinsed in phosphate (pH 7.3), and postfixed in 2% osmium tetroxide in 0.1 M potassium phosphate (pH 7.3). After dehydration in ethyl alcohol, specimens were critical point dried, mounted on stubs with silver paint and paste, and coated with gold-palladium in a Polaron E5100 sputter coater.

Blastobasis graminea Adamski, new species
(Figs. 1–26)

Diagnosis.—*Blastobasis graminea* can be distinguished from other *Blastobasis* by the orange gray ground color, wide base of the uncus, rounded outer margin of the proximal flange, and wide ostial opening.

Adult.—*Head:* Cephalic vestiture pale orange gray, except inner surface of labial palpus pale orange gray intermixed with brown scales tipped with white and few dark-brown scales, outer surface mostly brown intermixed with brown scales tipped with white, pale orange-gray scales, and dark-brown scales; segments paler near apical region.

Thorax: Tegula and mesoscutum pale orange gray; legs with outer surface pale orange gray intermixed with orange-gray scales tipped with white, most specimens with foreleg and midleg with outer surface mostly grayish brown intermixed with grayish-brown scales tipped with white, orange-scales, and orange-gray scales tipped with white, leg segments and tarsomeres paler near apical region; forewing (Fig. 1), length 7.1–10.0 mm [n = 37], orange gray intermixed with orange gray scales tipped with white, brown scales tipped with white, and brown scales; several unrubbed specimens with discal cell region paler than out-



Figs. 2, 3. *Blastobasis graminea*. 2, Wings, scale = 1.00 mm. 3, Male genitalia, scale = 0.5 mm.

er region of wing; holotype with a brown streak on basal part of posterior margin (Fig. 1); some specimens with veins demarcated with white scales; a dark brown midcell spot and two distal spots usually present; fringe scales mostly orange gray tipped with white intermixed with orange gray scales; undersurface grayish brown;

cubitus four-branched, divergent from radials and M_1 (Fig. 2); hindwing with both surfaces pale grayish brown; cubitus four-branched in a series typical of all New World *Blastobasis* (Fig. 2).

Abdomen: Orange gray.

Male Genitalia (Fig. 3): Uncus wide at base, posteriorly curved and narrowed apically, apical setae shorter than basal setae; gnathos bidentate; dorsal strut narrow; tergal setae numerous; diaphragma with microtrichia throughout, extending to proximal flange; proximal flange with stout marginal setae, margin rounded; lower part of valva with marginal setae, numerous along apical third; juxta bandlike; aedoeagus apically rounded, with several stout anellar setae.

Female Genitalia (Fig. 4): Ovipositor telescopic, in four membranous divisions; ostium within membranous area slightly posterior to seventh sternum; ostial opening wide; antrum membranous, narrowed abruptly anteriorly forming a common inception for ductus seminalis and ductus bursae; ductus bursae long, with two rows of platelike sclerotizations within anterior part; corpus bursae with posterior lobe near inception of ductus bursae; signum hornlike.

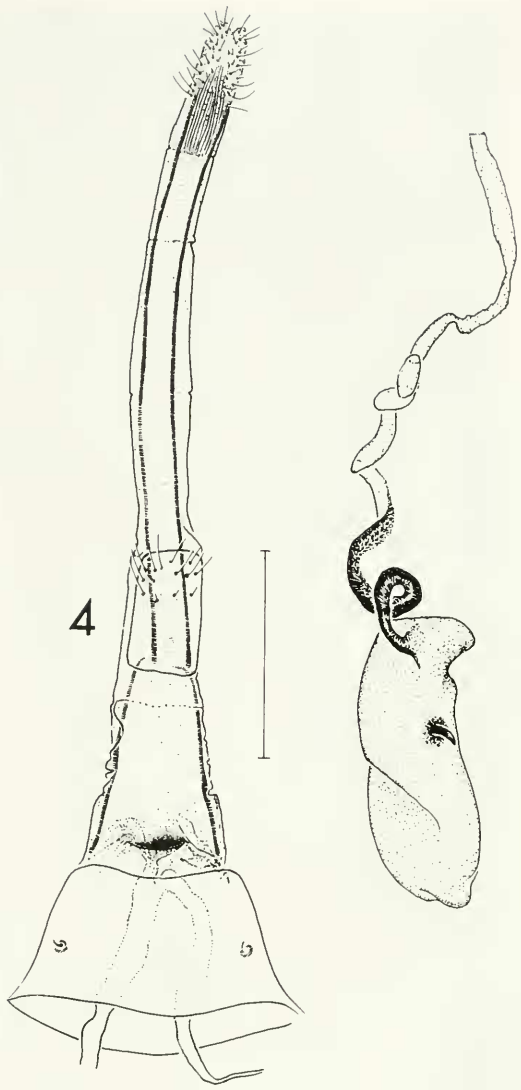
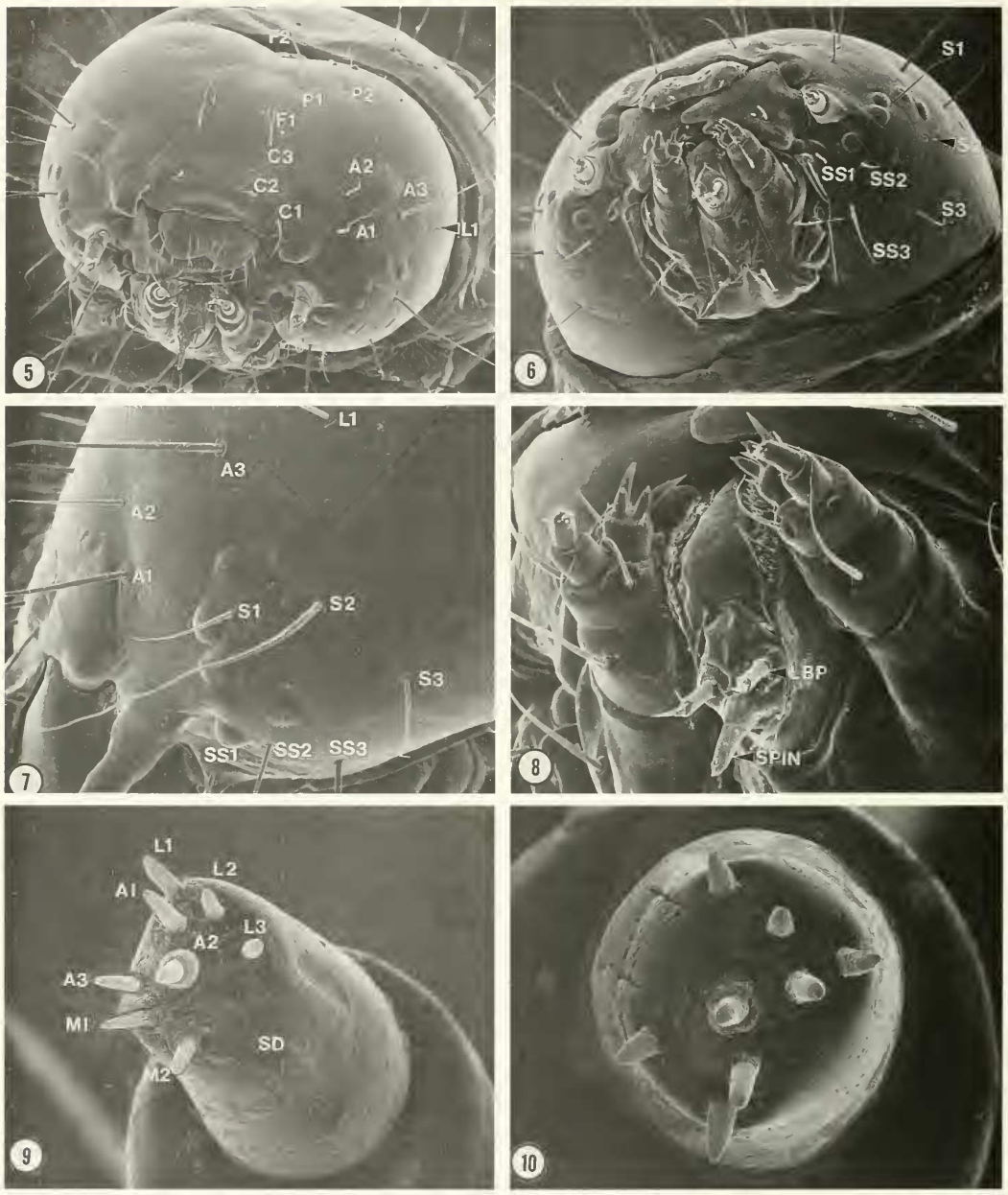


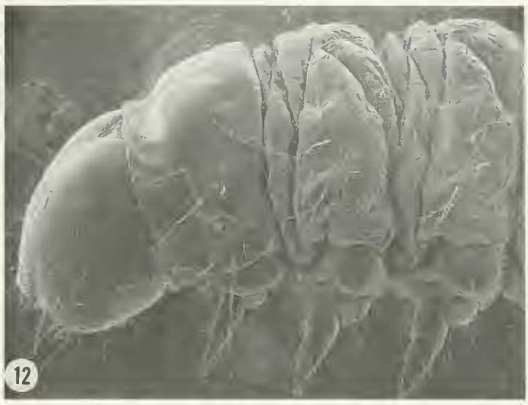
Fig. 4. Female genitalia of *Blastobasis graminea*. Scale = 1.00 mm.

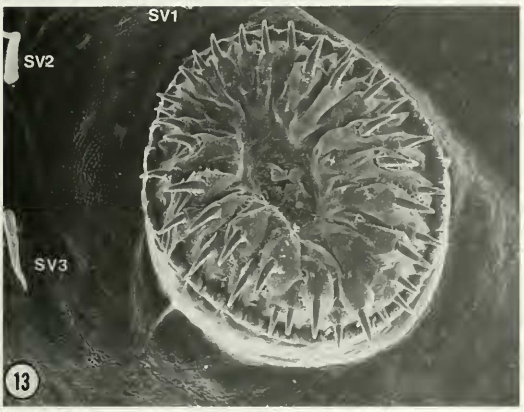
Larva.—Length 6.5–14.9 mm [n = 207]. Body white, smooth, with head capsule, prothoracic shield, anal shield, pinacula and crochets yellowish orange. *Head* (Figs. 5–12, 17, 18): Hypognathous; epicranium smooth; adfrontal sclerites narrow, delimiting frons dorsolaterally; frons closed; C1, C2, and C3 about equal in length, about three times length of F1 and F2; C3 closer to F1 than to C2; C2 slightly closer to midline than C1 or C3; C1 setae broadly curved, convergent; F1 subapical (Fig. 5); P1 long, closer to P2 than A2; A2 closer to A1 than A3; A3 nearly equidistant to A2 and L1 (Figs. 5–7); S1 between stemmata 2 and 3, and closer to S2 than to S3; SS1 near mandibular articulation, and closer to SS2 than to SS3; SS2 between stemmata 5 and 6 (Figs. 6, 7); labrum bilobed, each lobe with four subequal marginal setae and two subequal medial setae (Figs. 5, 6); mandibles slightly asymmetrical, with two distinct dentitions and two subequal setae on outer margin (Figs. 5, 6, 17); labium smooth with microtrichia along lateral margin of proximal half; distal part of labium with median submental pit (Figs. 6, 8); labial palpus two-segmented, with dorsally directed subapical seta on basal segment. Sensilla types and arrangement on median



Figs. 5–10. SEM of larva of *Blastobasis graminea*. 5, Frontal view of head capsule, 70×. 6, Ventral view of head capsule, 70×. 7, Lateral view of genal region of head capsule, 250×. 8, Ventral view of labium, LBP = labial palpus, SPIN = spinneret, 250×. 9, 10, Sensilla on apex of maxillary palpus, A2 = sensillum styloconicum; A1, M1, M2, L1, L2, L3, = sensilla basiconica; SD = sensilla digitiform, 2,500×.

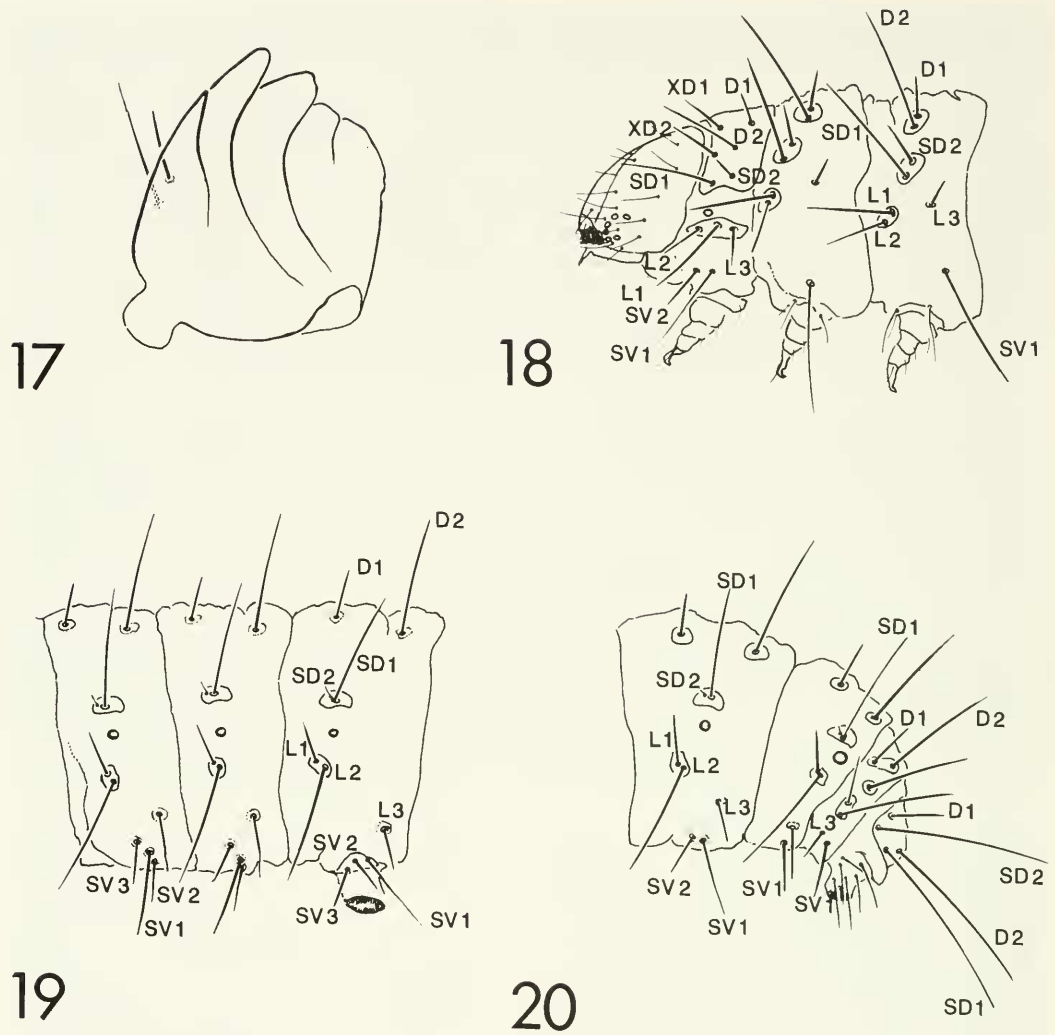
lobe and apex of palpus similar to that of *Glyphidocera juniperella* Adamski and Brown 1987, except for elongate depression near digitiform sensillum on part near L3 sensillum (Figs. 8–10). Sensilla types on antenna (Fig. 11) similar to other Lepidoptera (Schoonhoven and Dethier, 1966). *Prothorax* (Figs. 12, 18): Prothoracic shield with SD1 and D2 about equal in length, twice length of XD1 and XD2; SD1 and D2





Figs. 11–16. SEM of larva of *Blastobasis graminea*. 11, Sensilla on apical portion of antenna. 1 = sensilla basiconica; 2 = sensillum chaetica; 3 = sensullum styloconicum; 4 = sensillum trichodeum, 950×. 12, Lateral view of head capsule and thorax, 45×. 13, Ventral view of right proleg on A4, 200×. 14, A8-10, 60×. 15, Lateral view of A10, 80×. 16, Posetrior view of A10, 80×.

about four times length of SD2 and D1; D1 usually slightly longer than SD2; SD2 closer to SD1 than to XD2; SD2 and D2 anteriorad to D1; L1 about twice length of L2 and L3; SV1 about twice length of SV2; V1 short (not illustrated). *Mesothorax and metathorax* (Figs. 12, 18): D1 anterodorsal to D2, on same pinaculum; D2 about three times length of D1; SD1 anterioventral to SD2, on same pinaculum; SD1 about three



Figs. 17–20. Larva of *Blastobasis graminea*. 17, Left mandible. 18, Lateral view of head capsule and thorax. 19, A1-3. 20, A7-10.

times length of SD2; L2 anterioventral to L1, on same pinaculum; L1 slightly longer than L2 and about three times length of L3; SV1 about equal in length to L1 and slightly caudal to L3; V1 short (not illustrated). *Abdomen* (Figs. 13–16, 19, 20): A1 and A2 with D2 three times length of D1; SD1 about same length as D2; SD2 very short (Figured larger than normal), on same pinaculum as SD1 above spiracle; L1 anterodorsal to L2, L2 about twice length of L1; L3 caudal to D2, about equal in length to L1; SV3 2–3 times length of SV2 and SV1; SV2 and SV1 in nearly straight line perpendicular to longitudinal body axis, SV3 slightly anterior to SV1; V1 short (not illustrated); A3–A6 with SV1 posterior to SV2; prolegs with crochets uniserial and triordinal, crochets smaller along outer margin of planta; A7 with SV3 absent; A8 with SD1 hairlike; one SV seta present; SV1 nearly in verticle line with L3 and V1; SV1 and L3 about equal in length, V1 short (not illustrated); spiracle slightly larger than prothoracic and other abdominal spiracles; A9 with SD2 absent; L3 ventral to L2; SV1

caudal to D2; V1 short (not illustrated); A10 (Figs. 14–16, 20): D2, SD1, and SD2 about four times length of D1; crochets uniserial and triordinal.

Holotype.—♀, "Colombia: Instituto Colombiano Agropecuario, Experiment Station "Palmira," Cauca Valley, 1 March–15 March 1991, Ex. Sugar cane, Coll. Lucero Cárdenas Duque, Emerged 21 April–1 May 1991." The holotype is not dissected and is deposited in USNM.

Paratypes.—3 ♀, Same data as holotype. Paratypes are not dissected and are deposited in USNM.

Other specimens examined.—COLOMBIA: 2 ♂, 7 ♀, "Miranda (Val.), en. caña a [zúcar], Jul[y] 1984, L[ucero] Cárdenas"; 1 ♂, 1 ♀ from Vitor Becker Collection [yellow label]; 1 ♂, 5 ♀, "Miranda, VI-28–[19]84, L[ucero] Cárdenas," "Tallos caña de azúcar," "♀ Wing Slide by DA 3349, USNM 81585," [green label]," "♀ Genitalia Slide by D. Adamski 2885, USNM 81422," [green label]; 3 ♀, "Riopaila, Parasita *Diatraea*," "I-6–[19]65, 723–4," "II-1–[19]65, 9651–28," "II-15[19]65, 446–1"; 1 ♂, 1 ♀, "Ex. sugar cane, Ag. Exp. Sta., Palmira, Valle, Let. Oct. 3, 1941, B. Losada S," "♀ Genitalia Slide by R. B. Selander, USNM 11, 157," [green label]; 2 ♀, "Valle Ingenio del Cauca, H: caña de azúcar, Barrenador, Dic/[19]82, D-83," "♀ Genitalia Slide by D. Adamski 2849, USNM 81393," [green label], "♀ Genitalia Slide by D. Adamski 2850, USNM 81394," [green label]; 2 ♂, 1 ♀, "Valle Ing[enio] del Cauca, H: caña de azúcar Col: L[ucero] Cárdenas y Y.P. Chacon, II-[19]83, D-83," "♂ Genitalia Slide by D. Adamski 2847, USNM 81391," [green label], "♂ Genitalia Slide by D. Adamski 2846, USNM 81390," [green label], "♀ Genitalia Slide by D. Adamski 2848, USNM 81392," [green label]. VENEZUELA: 2 ♀, "Tachira, El Cobre, 12,00 m[e]t[e]rs, May 1947," and "Tachira, La Grita, 1,450 m[e]t[e]rs, 14.V.1949," "Reared from larva in Sugar cane," "♀ Genitalia Slide by R. B. Selander, USNM 11160," [green label], "♀ Genitalia Slide by R. B. Selander, USNM 11161" [green label]; 2 ♂, 1 ♀, "Maracay, 450 m[e]t[e]rs, 28.iii.1949, H.E. Box", "February 1951," "June 1948," "Reared from larva in Sugar cane," "♂ Genitalia Slide by D. Adamski 3038, USNM 81488" [green label], "♂ Wing Slide by J. G. Clarke, USNM 11209" [green label], "♂ Genitalia Slide by J. G. Clarke, USNM 11209" [green label], "♀ Genitalia Slide by R. B. Selander, USNM 11164" [green label]; 1 ♀, "Carabobo, Cent. Tacarigua, 450 m[e]t[e]rs, September 1947, H.E. Box," "Reared from larva in Sugar cane," "♀ Genitalia Slide by R. B. Selander, USNM 11159" [green label], 1 ♂, 3 ♀, "Yaracuy, Chivacoa, 230 m[e]t[e]rs, February 1950," "28.ii.1950," "San Pa[illegible], 400 m[e]t[e]rs, 22.ii.1949, H.E. Box," "Reared from larva in Sugar cane," "♂ Genitalia Slide by D. Adamski 3037, USNM 81487," [green label], "♀ Genitalia Slide by R. B. Selander, USNM 11163" [green label], "Reared from larva in Sugar cane," "♀ Genitalia Slide by J. G. Clarke, USNM 11210" [green label], "Reared from larva in Sugar cane," "♀ Genitalia Slide by R. B. Selander, USNM 11162," [green label], "Reared from larva in Sugar cane"; 1 ♂, "Merida, nr. Egido, 1,500 m[e]t[e]rs, 8.VI.1949, H. E. Box," "♂ Genitalia Slide by D. Adamski 3039, USNM 81489" [green label]; 1 ♀, "Miranda, Sta. Lucia, 180 m[e]t[e]rs, 5.iii.1948, H.E. Box," "♀ Genitalia Slide by J. C. Clarke, USNM 11207" [green label], "Reared from larva in Sugar cane"; 1 ♀, "Aragua, El Conseja, 550 m[e]t[e]rs, March 1951, H.E. Box," "Reared from larva in Sugar cane," "♀ Genitalia Slide by R. B. Selander, USNM 11158" [green label]; 1 ♂, "El Limon, nr, Maracay, 460 m[e]t[e]rs, 31.iii.1950, H.E. Box," "Reared from larva in *Ciox lachryma-jobi* [L]"; 1 ♀, "Zulia, Perijo, Mts. close to Colombia, Dec. 1950, F. Fernandez Yepoz," "Reared from larva in *Setaria paniculifera* [Fournier]," "♀ Genitalia Slide by J. F. Clarke, USNM 11208" [green label]; 1 ♀, "Vene-

zuela, Turbio Valley, nr. Barquisimeto, 1956, P. Guagliumi, Larva boring sugarcane, COM. INST. ENT. COLL. NO. 15211, Press[ented] by Com. Inst. Ent., BM 1957-256." Fourteen additional adult specimens were examined at The Natural History Museum, London, with above label data. Larvae studied were collected and preserved in alcohol with the following data, "Colombia: Instituto Colombiano Agropecuario, Experiment Station "Palmira," Cauca Valley, 15 December–20 January 1990, Ex. Sugar cane, Coll. Lucero Cárdenas Duque." All larval specimens are deposited in the USNM alcohol collection.

Types examined.—Lectotype designated by Clarke, ♂, *Blastobasis obstricta* Meyrick, "Lectotype" [round label], "Bartica, Brit[ish] Guiana, Parish 1.13," "Lectotype, *Auximobasis obstricta* Meyrick, J.F.C.C. 1948," "♂ Genitalia on Slide 5-X-1948, J.F.G.C. 8078," *Auximobasis obstricta* Meyr., E. Meyrick det., in Meyrick Coll. 21/1," "*obstricta* Meyr.," "Meyrick Coll., BM 1938-290," [Natural History Museum, London, England]. Lectotype, ♂, *Blastobasis subolivacea* Walsingham, "S[aint] Thomas, 9.IV.[18]94" [hand-written pink label], "*Blastobasis subolivacea* 125.2089 WLSM, ♂, TYPE" [hand-written label], "♂ Genitalia Slide by D. Adamski, 3470" [green label], "Holotype, *Blastobasis subolivacea* Wlsm, ♂," ["Grigore Antipa" National Museum of Natural History, Bucharest, Romania].

Etomology.—*Blastobasis graminea* is named after the plant family Gramineae because larvae feed on several grass hosts.

Discussion

Auximobasis obstricta Meyrick 1918, is transferred to *Blastobasis* Zeller, 1855, and *Blastobasis subolivacea* Walsingham, 1897, is transferred to *Holcocera* Clemens 1863 (**new combinations**).

Blastobasis graminea is probably more closely related to *Blastobasis obstricta* Meyrick, 1918, n. comb. than to any other described *Blastobasis*. Both species differ markedly in wing pattern and in several male and female genitalic features. However, males of both species share an uncus with a widened base, a bidentate gnathos, and stout marginal setae along the outer margin of the proximal flange. Females share a widened ostium.

Martorell (1976) reported two species of Blastobasidae feeding within sorghum heads in the Vieques Islands east of Puerto Rico, but I have not seen any specimens to substantiate this.

Biology

Cárdenas and Hernández (1985) described the biology of *Blastobasis graminea* on sugar cane in Colombia; these findings are summarized below. The most severe damage by *B. graminea* occurs within the terminal third of the sugar cane plant, however, damage can occur in lower regions as well. When the damage is extreme the apical portion of the plant dies.

Early instars of *B. graminea* feed on the surface tissue layers. When the larva is able, it bores into the stem. Galleries are usually irregularly shaped (Figs. 22–24); the larvae never excavate more than two internodes of the plant. Mature larvae usually pupate between the stem and the sheath (Fig. 21), but sometimes within the stem (Fig. 22). In addition to sugar cane, larvae feed on corn (Figs. 25, 26), sorghum, *Coix lacryma-jobi* L., and *Setaria paniculifera* Fournier.

There appears to be a strong correlation (Ratio of 8:1) between the presence of *Diatraea saccharalis* and *Blastobasis graminea*, however, it is not known which moth species attacks the plant first.

Acknowledgments

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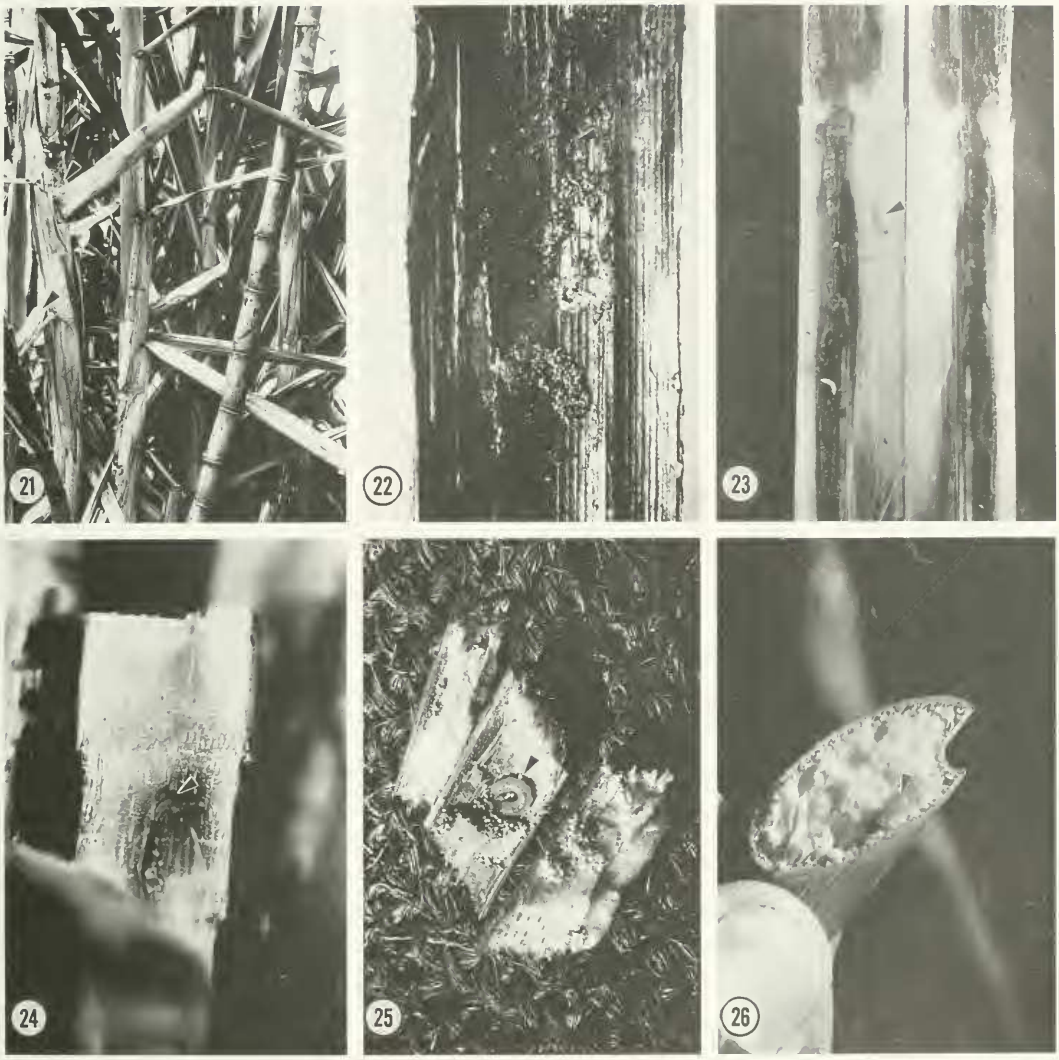

Figs. 21–26. Larval damage of *Blastobasis graminea*. 21, Pupal site on sugar cane (see arrow). 22, Pupa within sheath of sugar cane (see arrow). 23, Larvae and damage within sugar cane stem (see arrow). 24, Larval gallery within sugar cane stem (see arrow). 25, Larval damage in corn stem (see arrow). 26, Larva within corn stem (see arrow).

preserved larvae, and photographic prints of larval damage; Klaus Sattler, Michael Shaffer and Kevin Tuck, of the Natural History Museum, London, England, for their help with examination and photography of type specimens; Dorel Rusti, "Grigore Antipa" National Museum of Natural History, Bucharest, Romania, for the loan of the lectotype of *Blastobasis subolivacea* Walsingham; Greta Tyson and Michael Sullivan, of the Electron Microscope Center, Mississippi State University, for their help with the preparation of the specimens and photographic plates; Carl Hansen of the Office of Imaging, Printing and Photographic Services for the photograph of the holotype; the late John F. Gates Clarke, Smithsonian Institution, for referring this research problem to me. This research was supported in part by NSF Grant BSR85-01212 and a grant from Sigma Xi.

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